

# FORESTRY SCIENCE IN THE SERVICE OF MAN



## MAN: ENDANGERING THE MOUNTAIN ECOLOGY FORESTERS: RESTORING MAN ERODED TRAILS

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WATERSHED MANAGEMENT



Man, lately recognized as environmental polluter and despoiler, produces more of an impact on our natural resources than truly realized. Even in moments of innocent recreational participation, man can inadvertantly cause intensive environmental destruction of the forest resource. The major marks of human strain on the forest ecology appear as severe trail erosion and death to plant communities through trampling.

These are findings of a recent field study conducted through the Adirondack High Country by two environmental scientists.

The men, E.H.Ketchledge of the Department of Forest Botany, New York State College of Forestry, Syracuse, N.Y., and R.E.Leonard, USDA Forest Service watershed researcher, Syracuse, N.Y., discovered

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that forest recreation lands have a very specific carrying capacity for people. An excess of people causes environmental problems -- especially where the forest's ecological balance is delicate and precarious to begin with.

Just how severe and widespread is destruction by man, the hiker and climber? In order to find out, the scientists together inventoried 46 Adirondack peaks above 4,000 feet elevation and examined every mile of hiking trail in the High Country. Their speculations turned to fear as they realized the rapidity with which scenic summits are being lost and the intensity through which erosion is making many hiking trails past repair -- all because of the ever-increasing trespass of mountain climbers.

## **Trail Erosion**

Trail erosion is a natural phenomenon. However, in the Adirondack High Country there is what scientists describe as a very unusual combination of critical circumstances. First, Adirondack High Country slopes are steep and, because of vast quantities of rainwater moving downslope through them, they are extremely unstable and wash out quickly if disturbed. The soils themselves are unusual: they are typically shallow, particularly at higher elevations, and have a high content of partially-decayed organic materials which wash out quickly.

Each trail soon becomes a water-course cutting deeper with each successive storm until bedrock is exposed, generally a matter of only a few dozen years. Thereafter the waterflow undermines the soil bank on the downhill side of the trail, ever widening the cut. Hikers, trying to avoid the mud and water in the bottom of the trail, tend to walk on the side of the bank, accelerating the erosion.

## **Trailed Peaks**

In calculating how fast a typical trail washes out, the scientists found that average loss is one inch a year -- a startling amount figuring the many miles of trail traversing the mountain sides. They also discovered that much erosion is due to frost action which tumbles soil particles off the banks in spring and fall. Quite a lot is due to washout by rain.

But, after studying three trails for days on end, in all kinds of weather, and at all times of year, both Ketchledge and Leonard feel that hikers' boots, particularly those with the cleated vibram-type soles, are responsible for the greatest share of trail disturbance. The constant cutting in of boots roughens the surface, creating an easily eroded topography. With each step of the hiker, soil is depressed further into the bottom of the cut where the stream flowing downhill in the trail during and after a rainstorm carries it off the slopes.

## **Trailless Peaks**

It seems logical that peaks without maintained trails be immune to the problems of hiker impact. But this is not so. The latent pioneering, independent spirit of man is expressed by the forest recreationist who seemingly wanders "off the beaten track" to choose his own route and destination. Since there are not that many different routes possible up the remaining "trailless peaks", most of our isolated summits now bear "wilderness trails", with the footsteps of hundreds of independent climbers, who in many cases have initiated a problem of erosion.

Disturbing as the trail problem is, the scientists feel optimistic because resource managers already know fairly well how to handle the ecological degradation; rangers know how to locate trails wisely on a gradual traverse upslope instead of going straight up and down; they know how to put in water bars at regular intervals to shunt the water flow off the trails onto the forest floor where it can be slowly absorbed. To a great extent the technical know-how is available. What is often not available is adequate staffs to do the upkeep.

## **Summit Destruction**

One might think that a group of plants tough enough to withstand the extreme environmental condition prevailing on a wind-swept mountain summit would certainly be able to take the trampling of hikers. This, again, is not so. Cold temperatures, short growing seasons, infertile soils and drying winds are one thing, but the summer-long physical pounding under thousands of human feet is beyond reasonable expectation here where growing conditions themselves are treacherous.

The complicating factor in the alpine zone of the Adirondack High Country is the absence of a true meadow vegetation protecting the site. There is no tough sod of intertwining grass roots binding the soil together underground. The reason for this is reflected in the uniqueness of the alpine habitat: it is really an inverted bog.

In its simplest terms, a bog is a wet depression wherein peaty, saturated soils develop. One highly specialized plant group is universally present in all our northern bogs, namely sphagnum moss. It is the group responsible for peat formation.

But peat itself is not a good substrate for plant growth. It is lacking in nutrients, though it will retain them nicely when sufficient fertilizer is added. It is also very acid in chemical reaction. This combination of acidity and wetness produces a bog condition in which only a few specialized types of plants can survive.

Such a fragile plant, however well-adapted to the natural environment prevailing on the summits, cannot withstand the new phenomenon -- the advent of hordes of hikers criss-crossing the summit. So, in the alpine environment with a limited trespass capacity, footprints often become indelible tracks in the fragile tundra meadow -- spots which die back and soon start to erode out.

One antidote is to supplement the native flora with hardier, introduced vegetation. A second remedy is to fertilize to provide proper nutrients. Such treatments will restore the summits to their pre-recreationist condition. To this end, the researchers chose the sixth highest Adirondack peak, Mt. Dix, elevation 4,857 feet, as a test site. Mt. Dix has three summit ridge stretches of bare peat, badly eroded after the alpine plants were crushed to death. The scientists have termed it an ecological disaster.

After simple testing experiments with various grasses and fertilizers over a three year period, they found that fertilized plots will grow vigorous sod of seeded grass with 90 percent success. With this as basic information, an expedition of four ecologists from the College of Forestry packed 50 pounds of fertilizer and 10 pounds of grass seed to Mt. Dix. Their payoff was 70-80 percent successful grass cover -- what they elatedly called a beautiful, vigorous patch of lawn.

There are possible remedies for man's dangerous impact on his environment. Studies such as this done in the Adirondack High Country will ultimately lead to an erosion control guide for resource managers, suggesting ways to restore the man-eroded high-mountain trails and degraded summit areas.